SYSTEMATIC ANATOMY OF BAHAMIAN SPECIES OF BURSERA (BURSERACEAE)

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AS A RESULT of his work on the flora of the Bahamas and Turks and Caicos Islands, Donovan S. Correll (1979) has recognized three species of *Bursera.* He has described a new species, *B. frenningae*, as distinct from *B. simaruba* and *B. inaguensis.* The identification of these three taxa is presently based on qualitative morphological characters that can frequently vary.

The systematic anatomy of the Burseraceae has been described by Metcalfe and Chalk (1950, and the references cited therein). Webber (1941), Heimsch (1942), and Metcalfe and Chalk (1950) report on the apparent anatomical homogeneity of this family. For example, the vessels of the secondary xylem invariably have simple perforation plates and hexagonal-bordered pits, and the presence of resin canals in the secondary phloem is considered to be diagnostic for the family (Metcalfe & Chalk, 1950; Brizicky, 1962).

On the other hand, features such as thick- vs. thin-walled fibers have been found to be useful in segregating taxa at the generic level within the Burseraceae (Metcalfe & Chalk, 1950). Because of this, I hoped that supportive characters might be found in the stem anatomy that would further aid in the separation of these plants. I also thought that it might reveal the relationship of these three taxa.

Included in Correll's collections for propagation in the Bahamian collection at the Fairchild Tropical Garden are living stem pieces of two of the species; the third species is already under cultivation there. Radial, tangential, and transverse sections were cut from equivalent-sized stem pieces of *Bursera simaruba* (*Correll 49986*), *B. frenningae* (*Correll 49984*), and *B. inaguensis* (*Stevenson 448*). Voucher specimens bearing these collection numbers have been deposited in the FTG herbarium.

Subsequent examination of this material showed both similarities and differences. Some of these similarities revealed are in the wood structure: for example, all three taxa have diffuse porous wood composed of vessels with simple perforation plates and alternate hexagonal-bordered pitting, heterogeneous rays, numerous tyloses, and simple-pitted septate fibers. Vessel length is also fairly uniform (TABLE 1) among all three taxa.

However, the three taxa do have certain structural differences. Examination revealed that *Bursera simaruba* has an average vessel diameter of about 74 μm. (TABLE 1), a high percentage of biseriate rays (TABLE 2), resin canals and oil cells randomly arranged within the secondary phloem, and, of diagnostic importance, secondary phloem fibers.

Bursera inaguensis, on the other hand, has an average vessel diameter of about 60 μm., a very high percentage of biseriate rays, and, of diagnostic importance, resin canals arranged in obvious circumferential rings within the secondary phloem. *Bursera inaguensis*, in contrast to *B. simaruba*, does not have secondary phloem fibers.

TABLE 1. **Vessel diameter and length in three species of Bursera.***

	RANGE	MEAN	S.D.
	Diameter		
B. simaruba	45–108	73.8	13.4
B. inaguensis	36–78	59.6	11.7
B. frenningae	24–75	43.7	11.5
	Length		
B. simaruba	180–350	260.6	49.4
B. inaguensis	210–360	273.0	45.4
B. frenningae	180–400	287.2	43.7

* Measurements given in μm.

TABLE 2. **Ray type in three species of Bursera.**

	BISERIATE	TRISERIATE
B. simaruba	110 (80%)	26 (20%)
B. inaguensis	130 (96%)	6 (4%)
B. frenningae	69 (51%)	67 (49%)

Finally, examination revealed that *Bursera frenningae* has a mean vessel diameter of about 44 μm., a characteristically low percentage of biseriate rays (thus, a correspondingly high percentage of triseriate rays), and randomly arranged resin canals and oil cells in the secondary phloem; it also lacks secondary phloem fibers.

In summary, *Bursera simaruba* has vessels that are significantly larger in diameter than those of *B. frenningae* (which has the smallest vessel diameter), whereas *B. inaguensis* has intermediate-sized vessels. *Bursera frenningae* not only has the smallest vessel diameter, but also contains significantly higher percentages of triseriate rays than do the other two species. *Bursera simaruba* is the only taxon of the three that has fibers in the secondary phloem. While all three taxa have oil cells and resin canals within the secondary phloem, only *B. inaguensis* has these structures arranged in concentric, circumferential rings.

These various stem characters, all of which can be observed by using razor blade sections and a dissecting microscope, can be readily utilized to key out the three species as follows:

KEY TO BAHAMIAN SPECIES OF BURSERA BASED ON ANATOMICAL CHARACTERISTICS

1. Phloem fibers present in the secondary phloem. . . . . *B. simaruba.*
1. Phloem fibers not present in the secondary phloem.
    2. Oil cells and resin canals arranged in concentric, circumferential rings within the secondary phloem. . . . . *B. inaguensis.*
    2. Oil cells and resin canals arranged randomly within the secondary phloem. . . . . B. *frenningae.*

Thus, comparative stem anatomy fully supports Correll's (1979) recognition of three species of *Bursera* in the Bahamas and Turks and Caicos Islands. On anatomical as well as systematic grounds, *Bursera frenningae* is recognized as a new and distinct taxon.

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